LISTING OF CLAIMS WITH STATUS AND AMENDMENTS

1-78 (Canceled)

79. (Currently Amended) A method for producing a micro-, submicro- and/or nano-structure for modulating light, comprising the steps of:

providing a ~~theoretical simulation~~ mathematical model of a predicted shape and of predicted light modulating parameters for [the] a structure to be fabricated, the ~~simulation~~ model of the predicted light modulating parameters being based on an exact numerical calculation of fields within [the] a desired structure and outside a light emitting surface of the desired structure;

initiating fabrication of the structure;

characterizing the emitting surface of the structure by near-field and by far-field geometric and light profiling ~~at the surface, in the near-field~~ of the surface~~, and at far-field distances from the surface~~ to obtain measured parameters of the structure; and

~~predicting and~~ applying the measured parameters to the model iteratively while fabricating the emitting surface ~~integrally with said simulation and characterization steps~~.

80. (Currently Amended) The method of claim 79, wherein ~~fabricating~~ fabrication of said structure includes forming [an] said light emitting surface on [the] an end of an optical fiber, hollow fiber, or other waveguide.

81. (Currently Amended) The method of claim 79, wherein the step of providing a ~~simulation~~ model includes analyzing coupling efficiency, beam waist diameter, and ~~working~~

~~distance~~ taper angle for light emitted from said structure, and determining radius of curvature for said emitting surface for designing an optimal structure.

82. (Currently Amended) The method of claim 79, wherein the step of providing a ~~theoretical simulation~~ model includes finite element field calculations ~~and/or exact calculations~~ with ~~or without~~ interactively defined boundary conditions, and wherein characterizing the emitting surface includes monitoring the fabrication of the ~~nanostructure~~ structure using near-field and far-field optical characterization with scanned probe imaging.

83. (Withdrawn - Currently Amended) [A] The method of claim 79, wherein characterizing ~~a micro, submicro and/or nanostructure in which having a waveguide and/or~~ the emitting surface ~~including~~ of a structure includes:

determining the phase properties of light within the structure or of light emitted from the emitting surface, wherein such phase properties are assessed by ~~far-field or~~ near-field ~~techniques including~~ scanned probe microscopic techniques integrated with standard far-field techniques ~~or used without such techniques~~ to determine the phase properties of the structure ~~with or without on-line irradiation or local heat~~.

84. (Withdrawn - Currently Amended) The method of claim 83, wherein characterizing the emitting surface further includes measuring light emitted from the surface for return loss[,].

85. (Currently Amended) The method of claim 79, wherein the step of ~~fabricating~~ fabrication of the structure includes:

pulling an optical fiber to produce an axial protrusion at the end of the fiber[,]; and

controlling the shape of the protrusion by iterative characterization of the protrusion and comparison with the ~~theoretical simulation~~ predicted shape of the protrusion ~~structure~~ to form a lens.

86. (Previously Presented) The method of claim 85, wherein the fiber is fabricated to direct light exiting the fiber at an angle relative to the direction of the fiber axis.

87. (Previously Presented) The method of claim 85, wherein fabricating includes forming a cylindrical or elliptical lens.

88. (Previously Presented) The method of claim 85, further including stripping the fiber and thereafter selectively coating the fiber and/or lens.

89. (Currently Amended) The method of claim 88, wherein coating includes deposition of metal on said fiber and said lens, [and] the method further including forming an aperture in the metal coating on said lens.

90. (Previously Presented) The method of claim 89, wherein forming an aperture includes nanoindentation, ion beam etching, chemical etching, or femtosecond laser nonlinear ablation, or a combination thereof.

91. (Withdrawn - Currently Amended) [A] The method ~~for fabricating a micro, submicro and/or nanostructure for modulating light, comprising~~ of claim 79, further including the steps of:

forming a waveguide incorporating an emitting surface[,]; and

forming on said emitting surface Fresnel [and/or] optics, diffractive optics, [and/or] or a Bragg grating.

92. (Currently Amended) The method of claim 79, wherein the step of ~~fabricating~~ fabrication of the structure includes forming a waveguide having a core and ~~having an~~ including said emitting surface, [and] the method further including forming a diffraction pattern on the core to alter the index of refraction or topography of the core to focus emitted light, to compensate for light dispersion, to produce phase front correction in emitted light, to remove or impose birefringence, or to remove lens aberrations.

93. (Currently Amended) The method of claim 92, wherein forming a diffraction pattern includes:

coating an end of said waveguide core with metal and ~~dialectric~~ dielectric layers;

forming an aperture in said layers;

directing light through said aperture; and

manipulating the light, wherein the thickness and number of metal and ~~dialectric~~ dielectric layers ~~being~~ are matched to the wavelength of the light [to be] being manipulated.

94. (Previously Presented) The method of claim 79, wherein the step of fabricating includes forming a solid immersion lens on a high index optical fiber.

95. (Currently Amended) The method of claim 94, wherein the step of forming a solid immersion lens includes:

forming a ball on the end of a cylindrical or other structure; and

polishing the ball to produce a flat head that serves as the lens, wherein the cylindrical or other structure ~~could be used~~ serves as a force sensing device to control the position of the solid immersion lens.

96. (Currently Amended) The method of claim 95, ~~wherein forming said lens~~ further ~~includes~~ including providing diffractive optics on the lens.

97. (Withdrawn - Currently Amended) [A] The method of claim 79, wherein characterizing ~~optical and other surfaces in a sample imaging system in which~~ the emitting surface includes nanometric blocking or shadowing ~~is used together with~~ to obtain differences in intensity when [the] a nanometric blocking probe either blocks or does not block rays of a far-field imaging system ~~from the position~~ on the ~~sample~~ surface to improve resolution.

98. (Withdrawn - Currently Amended) [A] The method ~~for light control at the tip of a cylindrical or other structure, comprising~~ of claim 79, further including, during fabrication of the structure:

forming a tapered hollow micropipette;

introducing a solution into the micropipette;

forming a metal nanoseed in said solution; and

growing the seed to produce a nanoparticle in the micropipette for controlling light passing through the micropipette.

99. (Withdrawn) The method of claim 98, wherein forming a nanoseed includes inserting an end of the micropipette into a liquid for initiating seed formation.

100. (Withdrawn) The method of claim 99, further including pulling the micropipette out of the liquid at a rate controlled to produce a selected nanoparticle geometry at the end of the micropipette.

101. (Withdrawn - Currently Amended) [A] The method ~~for forming an optical or mechanical structure, comprising~~ of claim 79, wherein fabrication of the structure includes:

dipping a tip of the structure in a fluid medium; and

retracting the structure [witn] with nanometric control from the medium to form an optical or mechanical structure.

102. (Withdrawn - Currently Amended) [A] The method ~~for forming an optical or mechanical structure, comprising~~ of claim 79, wherein fabrication of the structure includes:

filling a micropipette with a material having a selected index of refraction;

causing a portion of said material to exit at the tip of the micropipette to produce a protrusion; and

shaping the protrusion to form an optical element or mechanical element.

103. (Withdrawn - Currently Amended) [A] The method of claim 79, wherein fabrication of the structure includes [for] fabricating a lens~~, comprising~~ by:

shaping a mold for use in forming a lens;

~~simulating~~ modeling the shape of the mold to define the desired shape ~~structure~~, refractive index, and light modulating properties of the lens to be formed in the mold;

characterizing the shape of the mold by geometric and light profiling of the mold surface in the near field and the far field; and

iteratively shaping the mold while ~~simulating~~ modeling and characterizing its shape.

104. (Withdrawn) The method of claim 103, further including forming multiple molds for use in fabricating a micro lens array.

105. (Withdrawn - Currently Amended) [A] The method of claim 79, wherein the fabrication of the structure comprises [for] producing an optical waveguide, ~~comprising~~ the method including:

~~simulating~~ modeling the desired parameters of the waveguide on the basis of a calculation of fields within the waveguide structure and outside a light emitting lens on the waveguide;

characterizing parameters of the lens by near-field and far-field geometric and light profiling of the lens; and

iteratively fabricating the waveguide and lens integrally with said ~~simulating~~ modeling and characterizing the lens parameters.

106. (Withdrawn - Currently Amended) The method of claim 105, further including:

integrating said near-field and far-field characterizing steps for testing waveguides and lenses ~~and thus aiding in the mounting and integration of these devices with on-line motion and characterization~~.

107. (Withdrawn) A method of fabricating a multimode optical fiber transmitter or coupler to a single mode structure, including: forming a tapered fiber and lens having a taper angle and radius of curvature, respectively, to provide a lens focus with high accuracy from the lens surface and having a waist diameter of about 3.8 microns.

108. (Withdrawn) A method in which extremely small spot size integral optical fiber lens are used to make a diffraction limited spot size and in which these devices can be cantilevered so that they could fit under the lens of a microscope or can be used as a straight lensed fiber so that a simple scanning integral lensed fiber based confocal (SILC) microscope can be built with the same piezo technology that is used for atomic force microscopes in order to replace complicated beam scanning confocal microscopes with much higher throughput, collection efficiency and resolution than conventional confocal beam scanners.

109. (Withdrawn) A method as in claim 108 in which a simple scanning integral lensed fiber based confocal (SILC) microscope can be built with the same piezo technology that is used for

atomic force microscopes in order to replace complicated beam scanning confocal microscopes with much higher throughput, collection efficiency and resolution than conventional confocal beam scanners.

110. (Withdrawn) A method for producing a confocal microsope in which an optical fiber is placed in the scanner of an atomic force microscope at the eyepiece or some other port of the microscope and is used as the lens of the microscope for final focusing and collection.

111. (Withdrawn) A method as in claim 110, in which a fiber bundle is used.